Effect of diet diversity on intake of leaves from woody plants in dairy sheep

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118. Effect of diet diversity on intake of leaves from woody plants in dairy sheep (Effekt der Diversität der Ration auf die Aufnahme an Blättern von Holzgewächse durch Milchschafe).
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Naturally grazing animals select their feed from rangelands which are often divers in species. Studies with small ruminants offered Mediterranean shrubs showed that, in a choice situation, intake was increased with an increasing number of feeds on offer (1). The hypotheses tested in the present study were that (i) total feed intake increases when offering a diverse diet compared to offering only a single feed, and (ii) that this effect is enhanced by increasing plant species diversity in the diet.
Methods: Two choice feeding experiments were conducted using twelve lactating East Friesian milk sheep. The basal diet consisted of barley straw, offered at *ad libitum* access, and concentrate given according to requirements for actual milk yield. Test feeds used in the experiments were dried and chopped leaves of three woody plants (*Betula pendula* (birch), *Castanea sativa* (chestnut), and *Juglans regia* (walnut)) native to Europe and of three woody plants (*Atriplex leucoclada* (saltbush), *Haloxylon articulatum* (saxaul), and *Salsola vermiculata* (saltwort)) characteristic for the dry Mediterranean area. In Experiment 1, six sheep received subsequently in 7-day periods binary choices of one of the six woody plants (in a random order) and barley straw. This choice was offered always during 4 h in the morning. The six control sheep received only barley straw at that time. For the rest of the day all sheep had access to the basal diet. Thus, Experiment 1 included six 7-day binary choice periods separated by 2 days of control feeding. In Experiment 2, a control group (n=5) received only barley straw during 4 h in the morning and a multiple choice group (n=6) got the choice to select from barley straw and all six experimental plants offered separately during the same time of the day and over 7 days. For the rest of the day the animals were fed with the basal diet. The group members were composed to similar proportions of previous groups. However, all animals were familiarized with the experimental feeds during 14 days before starting Experiment 2. The variables measured in both experiments were dry matter intake (DMI) after 4 and 24 h. Statistical analysis was performed with SAS 9.2 using a Mixed Model and Tukey's test.
Results: In the binary choice situation, *B. pendula* was most ($p<0.001$) preferred (DMI, 523 g/day) followed by *J. regia* (304), *C. sativa* (126), *A. leucoclada* (75), *S. vermiculata* (38) and *H. articulatum* (10). There were trends for a higher total DMI over 4 h ($p=0.05$) and 24 h ($p=0.1$) for the binary choice group compared to the control group (DMI, g/d at 4 h: 566 and 413; at 24 h: 1200 and 960, respectively). In the multiple choice situation, *B. pendula* was again most ($p<0.001$) preferred (DMI, 704 g/day), followed by barley straw (256) and *A. leucoclada* (103). The other four plants were almost entirely neglected (*C. sativa*, 3, *H. articulatum*, 2, *J. regia* and *S. vermiculata* <1 g DM/day). The total DMI after 4 h and 24 h were substantially higher ($p<0.001$) for the multiple choice group than for the control group (DMI, g/day at 4 h: 1068 and 475; at 24 h: 1764 and 1134, respectively). The total DMI after 4 and 24 h in the choice situation was even higher when comparing the multiple choice results (Exp. 1) with the binary choice results (Exp. 2).
Conclusion: Sheep clearly preferred birch in both, the binary choice and the multiple choice situation. Providing a choice among different feeds, as compared to offering only straw, led to trends and significantly higher total intakes in the binary and the multiple choice situation, respectively. This occurred within the actual choice period but also persisted across the entire day, i.e. it did not lead to a compensatory reduction in intake once the 4-h period was over. Comparing binary and multiple choice offers suggests that intake is promoted when the diversity in the diet is increasing.

1) ROGOSIC, J., ESTELL, R. E., SKOBIC, D., STANIC, S. (2007): Appl. Anim. Behav. Sci. 107: 58-65.

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